



SEQUENCE LISTING

<110> Melis, Anastasios
Wintz, Hsu-Ching Chen

<120> MODULATION OF SULFATE PERMEASE FOR
PHOTOSYNTHETIC HYDROGEN PRODUCTION

<130> BERK-016CIP

<140> 10/762,769

<141> 2004-01-21

<150> 60/354,760

<151> 2002-02-04

<150> 60/377,902

<151> 2002-05-02

<150> 10/350,298

<151> 2003-01-22

<160> 16

<170> FastSEQ for Windows Version 4.0

<210> 1

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<212> PRT

<213> Chlamydomonas reinhardtii

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<210> 6

<211> 1853

<212> DNA

<213> Chlamydomonas reinhardtii

<400> 6

gggcagcgta	taagtaatgt	cggttcttggc	tcccagctta	ggcgtcgcg	gggggattct	60
ggagccggcg	agtgcagcga	ggccgcctgc	gcacgcggcc	ggtcacgcac	ccgttctaac	120
aagcgatagg	actggtggac	ctgccgctaa	tcagacagag	cctgccgggtg	ctcccagccc	180
ccatgcggcg	tcgttgacgc	cctccagcag	cgggcaagca	agccagcaag	gcgaccccc	240
gcgctcgag	caccagcaag	cgcagcgcca	ggaccagcag	cagtgcagct	cgcggctcgt	300
ccaatcacac	ctcatcacgc	cggccacgct	gctgccagcc	ctgccgcctc	cgcctcccgg	360
cggcaacggc	gacggcgatg	gcggcggaagc	tgccggggcg	cagccgctcg	cggacgtcgc	420
ggctcagccg	ccggaggttg	tgctgacgct	ggcgtcgctt	gcgggtgacca	agctggcgta	480
cgtgcgtgtg	acgcgcgcgt	tccgggagtg	gtacgagcgc	acgaagggcg	tggatgtgcg	540
cttccgcctc	accttcgccg	ccagtggcgt	gcaggcccgc	gccgtgatcg	atggcctgcc	600
cgccgacatc	gtggccctgg	cgctgcctct	ggacctggac	aagatcggtg	cggcggggct	660
gatccggccc	gactggcgca	gcgcctaccc	ggcagccagc	gtgggtgtgcg	agaccaccgt	720
ggcggttcgtg	gtgcgccagg	gcaaccccaa	gaacatccgc	acctgggagg	acctcacgcg	780
ggcggggtgtg	gaggtggtgc	tggccaaccc	caagaccgcc	ggagtggcca	ggtggatctt	840

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cctggccctg tggggcgcca agatgaagaa gggcaacgcc gccgcgctgg cgtatgtgca 900
gcgcgtgttc gagaacgtgg tgggtgcagcc gcgtgatgcg cgcgaggcgt cggacgtgtt 960
ctataagcag aaggtgggcg acgtgctgtt gacgtacgag aacgaggtga tcctgaccaa 1020
cgaggtgtac ggcgacaagg cgctgccgta cctggtgccc tcctacaaca tccgcatcga 1080
gtgcccgcgt gcgctggtgg acaaggtggt ggatgcccgc ggccccgagg tgcgcgaggg 1140
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gtttttcgac gctggcgcca tccttgacga catccagtcc gccgtgggca agctgcgtgt 1380
ggagcagcgc aaggcggcgc aggcggcggc caggcggtag agagacgcgg tacaagtgt 1440
cgggtgtctc gcaggagctg cagcaggggc agcaagaggg ccttgacagg agggaatggt 1500
aggcaaaggc ggcaggggag gcgggatggc gggatgaagt gagggtgtgc aagcagcgat 1560
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ggcaggaggc ggcaaccgtg gagtgtctga aaggagaact tgattgtctc gtgtgggaca 1680
gataacggag ggcggggtgt ggggcgtggg gcttatcggt gtgcttctat ggggaggcct 1740
gactgcattg ggggcgacgt agtgtgatgg ccgctacacg cttgctcgga actgacataa 1800
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<210> 7

<211> 369

<212> PRT

<213> Chlamydomonas reinhardtii

<400> 7

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Met Ala Ser Thr Thr Leu Leu Gln Pro Ala Leu Gly Leu Pro Ser Arg
1      5      10
Val Gly Pro Arg Ser Pro Leu Ser Leu Pro Lys Ile Pro Arg Val Cys
20     25     30
Thr His Thr Ser Ala Pro Ser Thr Ser Lys Tyr Cys Asp Ser Ser Ser
35     40     45
Val Ile Glu Ser Thr Leu Gly Arg Gln Thr Ser Val Ala Gly Arg Pro
50     55     60
Trp Leu Ala Pro Arg Pro Ala Pro Gln Gln Ser Arg Gly Asp Leu Leu
65     70     75     80
Val Ser Lys Ser Gly Ala Ala Gly Gly Met Gly Ala His Gly Gly Gly
85     90     95
Leu Gly Glu Pro Val Asp Asn Trp Ile Lys Lys Leu Leu Val Gly Val
100    105    110
Ala Ala Ala Tyr Ile Gly Leu Val Val Leu Val Pro Phe Leu Asn Val
115    120    125
Phe Val Gln Ala Phe Ala Lys Gly Ile Ile Pro Phe Leu Glu His Cys
130    135    140
Ala Asp Pro Asp Phe Leu His Ala Leu Lys Met Thr Leu Met Leu Ala
145    150    155    160
Phe Val Thr Val Pro Leu Asn Thr Val Phe Gly Thr Val Ala Ala Ile
165    170    175
Asn Leu Thr Arg Asn Glu Phe Pro Gly Lys Val Phe Leu Met Ser Leu
180    185    190
Leu Asp Leu Pro Phe Ser Ile Ser Pro Val Val Thr Gly Leu Met Leu
195    200    205
Thr Leu Leu Tyr Gly Arg Thr Gly Trp Phe Ala Ala Leu Leu Arg Glu
210    215    220
Thr Gly Ile Asn Val Val Phe Ala Phe Thr Gly Met Ala Leu Ala Thr
225    230    235    240
Met Phe Val Thr Leu Pro Phe Val Val Arg Glu Leu Ile Pro Ile Leu
245    250    255
Glu Asn Met Asp Leu Ser Gln Glu Glu Ala Ala Arg Thr Leu Gly Ala
260    265    270
Asn Asp Trp Gln Val Phe Trp Asn Val Thr Leu Pro Asn Ile Arg Trp
275    280    285
Gly Leu Leu Tyr Gly Val Ile Leu Cys Asn Ala Arg Ala Met Gly Glu

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290		295		300
Phe Gly Ala Val Ser Val Ile Ser Gly Asn Ile Ile Gly Arg Thr Gln				
305		310		315
Thr Leu Thr Leu Phe Val Glu Ser Ala Tyr Lys Glu Tyr Asn Thr Glu				
		325		330
Ala Ala Phe Ala Ala Ala Val Leu Leu Ser Ala Leu Ala Leu Gly Thr				
		340		345
Leu Trp Ile Lys Asp Lys Val Glu Glu Ala Ala Ala Ala Glu Ser Arg				
		355		360
Lys				365

<210> 8
 <211> 465
 <212> PRT
 <213> Chlamydomonas reinhardtii

<220>
 <221> VARIANT
 <222> 438
 <223> Xaa = Any Amino Acid

<400> 8

Met Ala Ser Leu Leu Ala Gln Thr Thr Ser Arg Leu Gly Ala Arg Pro				
1	5	10	15	
Ala Ala Gln Ala Gly Pro Val Ala Gln Met Ala Pro Met Ala Ser Arg				
	20	25	30	
Val Gln Pro Ala Met Pro Ser Ala Leu Leu Pro Leu His Ala Arg Ala				
	35	40	45	
Thr Thr Thr Ser Val Ala Cys Arg Ala Ala Ser Ile Asp Lys Pro Val				
	50	55	60	
Val Tyr Thr Pro Arg Asp Ser Ser Gln Gln Ser Ser Asn Gly Ala Gly				
65	70	75	80	
Glu Val Ser Met Ser Ile Ser Ser Met Asp Glu Val Gly Pro Ser Tyr				
	85	90	95	
Glu Gly Ile Ile Thr Asp Ala Pro Thr Arg Pro Thr Gly Leu Tyr Val				
	100	105	110	
Arg Val Arg Asn Met Val Lys His Phe Ser Thr Ala Lys Gly Leu Phe				
	115	120	125	
Arg Ala Val Asp Gly Val Asp Val Asp Ile Glu Pro Ser Ser Ile Val				
	130	135	140	
Ala Leu Leu Gly Pro Ser Gly Ser Gly Lys Thr Thr Leu Leu Arg Leu				
145	150	155	160	
Ile Ala Gly Leu Glu Gln Pro Thr Gly Gly Asn Ile Tyr Phe Asp Asp				
	165	170	175	
Thr Asp Ala Thr Asn Leu Ser Val Gln Asp Arg Gln Ile Gly Phe Val				
	180	185	190	
Phe Gln Ser Tyr Ala Leu Phe Asn His Lys Thr Val Ala Glu Asn Ile				
	195	200	205	
Lys Phe Gly Leu Glu Val Arg Lys Leu Asn Ile Asp His Asp Lys Arg				
	210	215	220	
Val Ala Glu Leu Leu Ala Leu Val Gln Leu Thr Gly Leu Gly Asp Arg				
225	230	235	240	
Tyr Pro Arg Gln Leu Ser Gly Gly Gln Arg Gln Arg Val Ala Leu Ala				
	245	250	255	
Arg Ala Leu Ala Ser Asn Pro Arg Leu Leu Leu Leu Asp Glu Pro Phe				
	260	265	270	
Gly Ala Leu Asp Ala Val Val Arg Lys Gln Leu Arg Thr Gly Leu Arg				
	275	280	285	
Glu Ile Val Arg Ser Val Gly Val Thr Thr Ile Ile Val Thr His Asp				

290		295		300
Gln Glu Glu Ala Phe	Asp Leu Ala Asp Lys Val Val Val Phe Asn Arg			
305		310		315
Gly Leu Val Glu Gln Gln Gly Ser Pro Thr Glu Ile Ile Lys Arg Pro				
	325		330	335
Arg Thr Pro Phe Ile Met Lys Phe Val Gly Glu Thr Asn Val Val Pro				
	340		345	350
Ala Thr Ser Leu Leu Ala Lys Arg Met Arg Phe Asn Thr Ser Lys Thr				
	355		360	365
Ser Val Met Phe Arg Pro His Asp Ile Lys Leu Phe Lys Thr Val Pro				
	370		375	380
Pro Glu Ser Gly Glu Gly Ala Leu Thr Thr Val Gly Ala Asn Val Ala				
385		390		395
Asp Lys Ala Asn Leu Gly Trp Val Val Lys Tyr Thr Leu Arg Phe Asp				
	405		410	415
Asp Asp Val Glu Cys Glu Leu Gln Leu Ser Arg Asp Gln Asp Glu Arg				
	420		425	430
Glu Tyr Asn Leu Val Xaa Gly Ser Arg Val Phe Val His Val Pro His				
	435		440	445
Arg Thr Met Met Gly Phe Asn Ala Ser Asp Val Asp Ser Thr Pro Ile				
	450		455	460
Val				
465				

<210> 9

<211> 467

<212> PRT

<213> Chlamydomonas reinhardtii

<400> 9

Met Ser Phe Leu Ala Pro Ser Leu Gly Val Ala Arg Gly Ile Leu Glu	
1	5
Pro Ala Ser Ala Ala Arg Pro Pro Ala His Ala Ala Gly His Ala Pro	
	20
Val Leu Thr Ser Asp Arg Thr Gly Gly Pro Ala Ala Asn His Asp Arg	
	35
Pro Ala Gly Ala Pro Ser Pro His Ala Ala Ser Leu Thr Pro Ser Ser	
	50
Ser Gly Gln Ala Ser Gln Gln Gly Asp Pro Gln Arg Ser Gln His Gln	
65	70
Gln Ala Gln Arg Gln Asp Gln Gln Gln Ser Gln Ser Arg Ser Leu Gln	
	85
Ser His Leu Ile Thr Ala Ala Thr Leu Leu Pro Ala Leu Pro Pro Pro	
	100
Pro Pro Gly Gly Asn Gly Asp Gly Asp Gly Gly Glu Ala Ala Gly Pro	
	115
Gln Pro Leu Ala Asp Val Ala Ala Gln Pro Pro Glu Val Val Leu Thr	
	130
Leu Ala Ser Phe Ala Val Thr Lys Leu Ala Tyr Val Arg Val Thr Arg	
145	150
Ala Phe Arg Glu Trp Tyr Glu Arg Thr Lys Gly Val Asp Val Arg Phe	
	165
Arg Leu Thr Phe Ala Ala Ser Gly Val Gln Ala Arg Ala Val Ile Asp	
	180
Gly Leu Pro Ala Asp Ile Val Ala Leu Ala Leu Pro Leu Asp Leu Asp	
	195
Lys Ile Val Ser Ala Gly Leu Ile Arg Pro Asp Trp Arg Ser Ala Tyr	
	210
Pro Ala Ala Ser Val Val Cys Glu Thr Thr Val Ala Phe Val Val Arg	
225	230
	235
	240

Gln	Gly	Asn	Pro	Lys	Asn	Ile	Arg	Thr	Trp	Glu	Asp	Leu	Thr	Arg	Ala	
				245					250					255		
Gly	Val	Glu	Val	Val	Leu	Ala	Asn	Pro	Lys	Thr	Ala	Gly	Val	Ala	Arg	
			260					265					270			
Trp	Ile	Phe	Leu	Ala	Leu	Trp	Gly	Ala	Lys	Met	Lys	Lys	Gly	Asn	Ala	
		275					280						285			
Ala	Ala	Leu	Ala	Tyr	Val	Gln	Arg	Val	Phe	Glu	Asn	Val	Val	Val	Gln	
	290					295					300					
Pro	Arg	Asp	Ala	Arg	Glu	Ala	Ser	Asp	Val	Phe	Tyr	Lys	Gln	Lys	Val	
305					310					315					320	
Gly	Asp	Val	Leu	Leu	Thr	Tyr	Glu	Asn	Glu	Val	Ile	Leu	Thr	Asn	Glu	
			325						330					335		
Val	Tyr	Gly	Asp	Lys	Ala	Leu	Pro	Tyr	Leu	Val	Pro	Ser	Tyr	Asn	Ile	
			340					345					350			
Arg	Ile	Glu	Cys	Pro	Leu	Ala	Leu	Val	Asp	Lys	Val	Val	Asp	Ala	Arg	
		355					360					365				
Gly	Pro	Glu	Val	Arg	Glu	Ala	Ala	Ser	Glu	Phe	Cys	Arg	Phe	Leu	Phe	
	370					375					380					
Thr	Pro	Ala	Ala	Gln	His	Glu	Phe	Ala	Arg	Leu	Gly	Phe	Arg	Val	Asn	
385				390						395					400	
Pro	Arg	Thr	Cys	Lys	Glu	Val	Ala	Ala	Gln	Gln	Thr	Gly	Leu	Pro	Pro	
			405						410					415		
Ala	Asn	Leu	Trp	Gln	Val	Asp	Lys	Glu	Leu	Gly	Gly	Trp	Ala	Ala	Ala	
			420					425					430			
Gln	Lys	Lys	Phe	Phe	Asp	Ala	Gly	Ala	Ile	Leu	Asp	Asp	Ile	Gln	Ser	
	435						440				445					
Ala	Val	Gly	Lys	Leu	Arg	Val	Glu	Gln	Arg	Lys	Ala	Ala	Gln	Ala	Ala	
	450					455					460					
Ala	Arg	Arg														
465																

<210> 10

<211> 284

<212> PRT

<213> N. olivacea

<400> 10

Met	Phe	Asp	Pro	Lys	Ser	Leu	Asp	Ser	Gly	Ser	Arg	Ser	Ile	Leu	Thr	
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Met	Lys	Asn	Arg	Leu	Val	Ser	Trp	Ala	Trp	Ala	Leu	Thr	Leu	Met	Tyr	
		20						25					30			
Met	Leu	Val	Ser	Leu	Ile	Leu	Pro	Ile	Gly	Ala	Leu	Leu	Gln	Lys	Ser	
		35					40					45				
Ser	Gln	Glu	Ser	Val	Ser	Glu	Phe	Val	Ser	Ile	Ala	Thr	Ala	Pro	Val	
	50					55				60						
Ala	Met	Ser	Ala	Tyr	Ala	Val	Thr	Leu	Ser	Ser	Ala	Leu	Ile	Ala	Ala	
65					70					75					80	
Leu	Leu	Asn	Gly	Val	Phe	Gly	Leu	Leu	Ile	Ala	Trp	Val	Leu	Val	Arg	
			85						90					95		
Tyr	Glu	Phe	Pro	Gly	Arg	Arg	Leu	Leu	Asp	Ala	Ala	Val	Asp	Leu	Pro	
			100					105					110			
Phe	Ala	Leu	Pro	Thr	Ser	Val	Ala	Gly	Leu	Thr	Leu	Ala	Thr	Val	Tyr	
		115					120					125				
Ser	Asp	Gln	Gly	Trp	Ile	Gly	Thr	Trp	Leu	Ser	Ser	Leu	Asn	Ile	Gln	
	130					135					140					
Val	Ala	Phe	Thr	Arg	Leu	Gly	Val	Met	Leu	Ala	Met	Leu	Phe	Val	Ser	
145					150					155					160	
Phe	Pro	Phe	Val	Val	Arg	Thr	Leu	Gln	Pro	Val	Leu	Gln	Asp	Met	Glu	
			165						170					175		
Arg	Glu	Leu	Glu	Ala	Ala	Trp	Ser	Leu	Gly	Ala	Ser	Pro	Phe	Asn		
			180				185					190				

Thr	Phe	Leu	Arg	Val	Leu	Cys	Pro	Pro	Leu	Met	Pro	Ala	Met	Met	Thr
		195					200					205			
Gly	Ile	Ala	Leu	Ala	Phe	Ser	Arg	Ala	Val	Gly	Glu	Tyr	Gly	Ser	Val
	210					215					220				
Val	Ile	Val	Ser	Gly	Asn	Ile	Pro	Phe	Gln	Asp	Leu	Ile	Ala	Pro	Val
225					230					235					240
Leu	Ile	Phe	Gln	Arg	Leu	Glu	Gln	Tyr	Asp	Tyr	Ser	Gly	Ala	Thr	Val
			245						250					255	
Ile	Gly	Thr	Val	Val	Leu	Leu	Ile	Ser	Leu	Thr	Leu	Leu	Leu	Ala	Ile
			260					265					270		
Asn	Trp	Ile	Gln	Ala	Ser	Asn	Arg	Lys	Phe	Leu	Gly				
	275						280								

<210> 11
 <211> 269
 <212> PRT
 <213> M. viride

Met	Asn	Tyr	Phe	Ser	Lys	Leu	Ser	Cys	Ser	Trp	Arg	Ile	Thr	Leu	Gly
1				5					10					15	
Tyr	Leu	Leu	Phe	Met	Leu	Ile	Leu	Pro	Ile	Leu	Ala	Leu	Leu	Ser	Arg
			20					25					30		
Ala	Ser	Gln	Glu	Leu	Phe	Ser	Asn	Phe	Trp	Ser	Ile	Ala	Met	Glu	Pro
		35					40					45			
Ala	Ala	Ile	Tyr	Ala	Tyr	Ser	Ile	Thr	Leu	Ser	Met	Ala	Leu	Ile	Ala
	50					55					60				
Ser	Ile	Val	Asn	Gly	Ile	Phe	Gly	Ile	Phe	Ile	Ala	Trp	Ile	Leu	Val
65					70					75					80
Arg	Tyr	Asn	Phe	Pro	Gly	Lys	Arg	Ile	Val	Asp	Ala	Ala	Ile	Asp	Leu
				85					90					95	
Pro	Phe	Ala	Leu	Pro	Thr	Ser	Val	Ala	Gly	Leu	Thr	Leu	Ala	Thr	Val
			100					105					110		
Tyr	Ser	Glu	Lys	Gly	Trp	Ile	Gly	His	Phe	Leu	Gln	Ser	Leu	Ser	Ile
		115					120					125			
Lys	Val	Val	Phe	Thr	Lys	Leu	Gly	Val	Gly	Val	Ala	Met	Ile	Phe	Val
	130					135					140				
Ser	Phe	Pro	Phe	Val	Val	Arg	Thr	Leu	Gln	Pro	Val	Leu	Gln	Asp	Ile
145					150					155					160
Glu	Lys	Glu	Leu	Glu	Glu	Ala	Ala	Trp	Ser	Leu	Gly	Ala	Ser	Ser	Trp
				165				170					175		
Thr	Thr	Phe	Trp	Lys	Val	Ile	Phe	Pro	Ser	Leu	Ile	Pro	Ser	Leu	Leu
			180					185					190		
Thr	Gly	Ile	Ala	Leu	Ala	Phe	Ser	Arg	Ala	Val	Gly	Glu	Tyr	Gly	Ser
		195					200					205			
Val	Val	Ile	Ile	Ala	Ser	Asn	Ile	Pro	Phe	Lys	Asp	Leu	Thr	Ala	Pro
	210					215					220				
Val	Leu	Ile	Phe	Gln	Lys	Leu	Glu	Gln	Tyr	Asp	Tyr	Thr	Gly	Ala	Thr
225					230					235					240
Val	Ile	Gly	Thr	Val	Ile	Leu	Ser	Ile	Ser	Leu	Phe	Ile	Leu	Val	Gly
				245					250					255	
Ile	Asn	Ile	Ile	Gln	Ser	Leu	Asn	Gln	Met	Tyr	Ser	Lys			
			260					265							

<210> 12
 <211> 411
 <212> PRT
 <213> C. reinhardtii

<400> 12

Met	Glu	Arg	Val	Cys	Ser	His	Gln	Leu	Ala	Ser	Ser	Arg	Gly	Arg	Pro
1				5					10					15	
Cys	Ile	Ala	Gly	Val	Gln	Arg	Ser	Pro	Ile	Arg	Leu	Gly	Thr	Ser	Ser
			20					25					30		
Val	Ala	His	Val	Gln	Val	Ser	Pro	Ala	Gly	Leu	Gly	Arg	Tyr	Gln	Arg
		35					40					45			
Gln	Arg	Leu	Gln	Val	Val	Ala	Ser	Ala	Ala	Ala	Ala	Ala	Ala	Phe	Asp
	50					55				60					
Pro	Pro	Gly	Gly	Val	Ser	Ala	Gly	Phe	Ser	Gln	Pro	Gln	Gln	Gln	Leu
65					70					75					80
Pro	Gln	Gln	His	Pro	Arg	Gln	Pro	Gln	Ala	Val	Ala	Glu	Val	Ala	Val
				85					90					95	
Ala	Glu	Ser	Val	Ser	Ala	Pro	Ala	Ser	Ala	Ala	Pro	Ser	Asn	Asp	Gly
			100					105					110		
Ser	Pro	Thr	Ala	Ser	Met	Asp	Gly	Gly	Pro	Ser	Ser	Gly	Leu	Ser	Ala
		115					120					125			
Val	Pro	Ala	Ala	Ala	Thr	Ala	Thr	Asp	Leu	Phe	Ser	Ala	Ala	Ala	Arg
	130					135						140			
Leu	Arg	Leu	Pro	Asn	Leu	Ser	Pro	Ile	Ile	Thr	Trp	Thr	Phe	Met	Leu
145					150					155					160
Ser	Tyr	Met	Ala	Phe	Met	Leu	Ile	Met	Pro	Ile	Thr	Ala	Leu	Leu	Gln
				165					170					175	
Lys	Ala	Ser	Leu	Val	Pro	Leu	Asn	Val	Phe	Ile	Ala	Arg	Ala	Thr	Glu
			180					185					190		
Pro	Val	Ala	Met	His	Ala	Tyr	Tyr	Val	Thr	Phe	Ser	Cys	Ser	Leu	Ile
	195						200					205			
Ala	Ala	Ala	Ile	Asn	Cys	Val	Phe	Gly	Phe	Val	Leu	Ala	Trp	Val	Leu
	210					215						220			
Val	Arg	Tyr	Asn	Phe	Ala	Gly	Lys	Lys	Ile	Leu	Asp	Ala	Ala	Val	Asp
225					230					235					240
Leu	Pro	Phe	Ala	Leu	Pro	Thr	Ser	Val	Ala	Gly	Leu	Thr	Leu	Ala	Thr
				245					250					255	
Val	Tyr	Gly	Asp	Glu	Phe	Phe	Ile	Gly	Gln	Phe	Leu	Gln	Ala	Gln	Gly
			260					265					270		
Val	Gln	Val	Val	Phe	Thr	Arg	Leu	Gly	Val	Val	Ile	Ala	Met	Ile	Phe
		275					280					285			
Val	Ser	Phe	Pro	Phe	Val	Val	Arg	Thr	Met	Gln	Pro	Val	Met	Gln	Glu
	290					295					300				
Ile	Gln	Lys	Glu	Met	Glu	Glu	Ala	Ala	Trp	Ser	Leu	Gly	Ala	Ser	Gln
305					310					315					320
Trp	Arg	Thr	Phe	Thr	Asp	Val	Val	Leu	Pro	Pro	Leu	Leu	Pro	Ala	Leu
				325					330					335	
Leu	Thr	Gly	Thr	Ala	Leu	Ala	Phe	Ser	Arg	Ala	Leu	Gly	Glu	Phe	Gly
			340					345					350		
Ser	Ile	Val	Ile	Val	Ser	Ser	Asn	Phe	Ala	Phe	Lys	Asp	Leu	Ile	Ala
		355					360					365			
Pro	Val	Leu	Ile	Phe	Gln	Cys	Leu	Glu	Gln	Tyr	Asp	Tyr	Val	Gly	Ala
	370					375					380				
Thr	Val	Ile	Gly	Thr	Val	Leu	Leu	Leu	Ile	Ser	Leu	Val	Met	Met	Leu
385					390					395					400
Ala	Val	Asn	Gln	Leu	Gln	Lys	Leu	Ala	Arg	Lys					
				405					410						

<210> 13

<211> 266

<212> PRT

<213> C. vulgaris

<400> 13

Met	Lys	Arg	Tyr	Pro	Thr	Phe	Ile	Lys	Asn	Ser	Ile	Leu	Leu	Phe	Tyr
1				5					10					15	
Phe	Phe	Phe	Leu	Leu	Ile	Leu	Pro	Val	Val	Val	Leu	Phe	Leu	Leu	Ile
			20					25					30		
Phe	Gln	Asn	Asn	Trp	His	Glu	Val	Leu	Arg	Lys	Ala	Thr	Asp	Pro	Ile
		35					40					45			
Ala	Val	Ser	Ala	Tyr	Leu	Leu	Thr	Val	Gln	Met	Ala	Phe	Tyr	Ala	Ala
	50					55					60				
Leu	Val	Asn	Ser	Ile	Phe	Gly	Phe	Ile	Ile	Thr	Trp	Val	Leu	Thr	Arg
65					70					75					80
Tyr	Gln	Phe	Trp	Gly	Arg	Glu	Phe	Leu	Asp	Ala	Ala	Val	Asp	Leu	Pro
				85					90					95	
Phe	Ala	Leu	Pro	Thr	Ser	Val	Ala	Gly	Leu	Thr	Leu	Ala	Thr	Val	Tyr
			100					105					110		
Gly	Asp	Gln	Gly	Trp	Ile	Gly	Ser	Leu	Phe	Asn	Leu	Phe	Gly	Phe	Gln
		115					120					125			
Ile	Val	Phe	Thr	Lys	Ile	Gly	Val	Leu	Leu	Ala	Met	Ile	Phe	Val	Ser
	130					135					140				
Phe	Pro	Phe	Val	Ile	Arg	Thr	Leu	Gln	Pro	Val	Leu	Gln	Glu	Met	Glu
145					150					155					160
Lys	Ser	Leu	Glu	Glu	Ala	Ala	Trp	Ser	Leu	Gly	Ala	Ser	Ser	Trp	Glu
				165					170					175	
Thr	Phe	Arg	Lys	Val	Ile	Leu	Pro	Thr	Leu	Trp	Pro	Ala	Leu	Phe	Thr
			180					185					190		
Gly	Phe	Thr	Leu	Ser	Phe	Ser	Arg	Ala	Leu	Gly	Glu	Phe	Gly	Ser	Ile
		195					200					205			
Val	Met	Ile	Ser	Ser	Asn	Leu	Pro	Phe	Lys	Asp	Leu	Val	Ala	Ser	Val
	210					215					220				
Leu	Ile	Tyr	Gln	Ser	Leu	Glu	Gln	Tyr	Asp	Tyr	Leu	Gly	Ala	Ser	Val
225					230					235					240
Ile	Gly	Ala	Val	Val	Leu	Leu	Ile	Ala	Leu	Phe	Thr	Leu	Leu	Leu	Ile
				245					250					255	
Asn	Ala	Phe	Gln	Ile	Met	Lys	Phe	Arg	Val						
			260					265							

<210> 14

<211> 278

<212> PRT

<213> Synechococcus sp. PCC 7942

<400> 14

Met	Ser	Leu	Arg	Leu	Pro	Ser	Leu	Ser	Phe	Thr	Trp	Leu	Thr	Arg	Leu
1				5					10					15	
Ser	Trp	Ser	Trp	Arg	Phe	Thr	Trp	Val	Tyr	Leu	Thr	Leu	Ile	Leu	Phe
			20					25					30		
Ile	Pro	Ile	Ile	Ala	Leu	Phe	Leu	Lys	Ser	Ala	Ser	Leu	Pro	Leu	Gly
		35					40					45			
Arg	Ile	Trp	Glu	Leu	Ala	Thr	Gln	Pro	Val	Ala	Val	Ala	Ala	Tyr	Glu
	50					55					60				
Val	Thr	Phe	Gly	Leu	Ser	Leu	Ala	Ala	Ala	Ala	Leu	Asn	Gly	Val	Phe
65					70					75					80
Gly	Val	Ile	Ile	Ala	Trp	Val	Leu	Thr	Arg	Tyr	Asp	Phe	Pro	Gly	Lys
				85					90					95	
Lys	Leu	Phe	Asp	Ser	Phe	Ile	Asp	Leu	Pro	Phe	Ala	Leu	Pro	Thr	Ala
			100					105					110		
Val	Ala	Gly	Leu	Thr	Leu	Ala	Thr	Val	Tyr	Ser	Asp	Lys	Gly	Trp	Ile
		115					120					125			
Gly	Gln	Phe	Ile	Ala	Pro	Phe	Gly	Val	Gln	Ile	Ala	Phe	Thr	Arg	Trp
	130					135					140				
Gly	Val	Leu	Leu	Ala	Met	Val	Phe	Ile	Ser	Leu	Pro	Phe	Val	Val	Arg

145					150					155				160	
Thr	Val	Glu	Pro	Leu	Leu	Leu	Glu	Leu	Glu	Val	Glu	Ala	Glu	Glu	Ala
				165					170					175	
Ala	Ala	Ser	Leu	Gly	Ala	Ser	Pro	Ser	Glu	Thr	Phe	Trp	Arg	Val	Ile
			180					185					190		
Leu	Pro	Pro	Ile	Leu	Pro	Gly	Val	Leu	Ala	Gly	Val	Ala	Gln	Gly	Phe
		195					200					205			
Ser	Arg	Ala	Val	Gly	Glu	Phe	Gly	Ser	Val	Val	Ile	Ile	Ser	Gly	Asn
	210					215					220				
Leu	Pro	Phe	Asp	Asp	Leu	Ile	Ala	Pro	Val	Leu	Ile	Phe	Glu	Arg	Leu
225					230					235					240
Glu	Gln	Tyr	Asp	Tyr	Ala	Gly	Ala	Thr	Val	Ile	Gly	Ser	Val	Leu	Leu
			245						250					255	
Leu	Phe	Ser	Leu	Val	Ile	Leu	Phe	Val	Ile	Asn	Ala	Leu	Gln	Asn	Trp
			260					265					270		
Ser	Ser	Arg	Tyr	Asn	Gly										
		275													

<210> 15
 <211> 288
 <212> PRT
 <213> M. polymorpha

<400> 15															
Met	Ile	Pro	Leu	Phe	Phe	Ile	Pro	Pro	Phe	Ile	Ile	Leu	Phe	Ile	Thr
1				5					10					15	
Lys	Gly	Lys	Phe	Arg	Phe	Leu	Thr	Lys	Phe	Glu	Leu	Val	Leu	Ala	Cys
			20					25					30		
Ala	Leu	His	Tyr	Gly	Thr	Phe	Ile	Leu	Ala	Leu	Pro	Ile	Phe	Phe	Leu
		35					40					45			
Leu	Tyr	Lys	Thr	Lys	Gln	Gln	Pro	Trp	Asn	Ile	Leu	Leu	Gln	Thr	Ala
	50					55					60				
Leu	Glu	Pro	Val	Val	Leu	Ser	Ala	Tyr	Gly	Phe	Thr	Phe	Leu	Thr	Ala
65					70				75					80	
Leu	Leu	Ala	Thr	Ile	Ile	Asn	Ala	Ile	Phe	Gly	Leu	Ile	Leu	Ala	Trp
				85					90					95	
Val	Leu	Val	Arg	Tyr	Glu	Phe	Pro	Gly	Lys	Lys	Leu	Leu	Asp	Ala	Thr
			100					105					110		
Val	Asp	Leu	Pro	Phe	Ala	Leu	Pro	Thr	Ser	Val	Gly	Gly	Leu	Thr	Leu
	115						120					125			
Met	Thr	Val	Phe	Asn	Asp	Lys	Gly	Trp	Ile	Lys	Pro	Ile	Cys	Ser	Trp
	130					135					140				
Leu	Asn	Ile	Lys	Ile	Val	Phe	Asn	Pro	Ile	Gly	Val	Leu	Leu	Ala	Met
145					150					155					160
Ile	Phe	Val	Ser	Leu	Pro	Phe	Val	Val	Arg	Thr	Ile	Gln	Pro	Val	Leu
				165					170					175	
Gln	Asn	Met	Glu	Glu	Asp	Leu	Glu	Glu	Ala	Ala	Trp	Cys	Leu	Gly	Ala
			180					185					190		
Ser	Pro	Trp	Thr	Thr	Phe	Trp	His	Ile	Leu	Phe	Pro	Pro	Leu	Thr	Pro
		195					200					205			
Ser	Leu	Leu	Thr	Gly	Thr	Thr	Leu	Gly	Phe	Ser	Arg	Ala	Leu	Gly	Glu
	210					215					220				
Tyr	Gly	Ser	Ile	Val	Leu	Ile	Ala	Ser	Asn	Ile	Pro	Met	Lys	Asp	Leu
225					230					235					240
Val	Ile	Ser	Val	Leu	Leu	Phe	Gln	Lys	Leu	Glu	Gln	Tyr	Asp	Tyr	Lys
				245					250					255	
Ser	Ala	Thr	Ile	Ile	Ala	Ser	Phe	Val	Leu	Ile	Ile	Ser	Phe	Thr	Ala
			260					265					270		
Leu	Phe	Phe	Ile	Asn	Lys	Ile	Gln	Leu	Trp	Lys	Lys	Thr	Phe	His	Lys
		275					280					285			

<210> 16
 <211> 279
 <212> PRT
 <213> B. halodurans

<400> 16
 Met Lys Ser Val Arg Ser Trp Lys Asn His Asn Ile Leu Pro Gly Phe
 1 5 10 15
 Gly Leu Ser Leu Gly Phe Thr Met Met Tyr Leu Gly Ile Leu Val Leu
 20 25 30
 Leu Pro Leu Ser Met Val Phe Ile Asn Thr Ser Ser Met Gly Trp Gln
 35 40 45
 Ala Phe Trp Gln Ala Ile Thr Glu Pro Arg Val Leu Ala Ser Tyr Arg
 50 55 60
 Leu Ser Phe Gly Ala Ala Ile Ile Ala Ala Ser Ile Asn Ala Val Phe
 65 70 75 80
 Gly Leu Leu Ile Ala Trp Val Leu Val Arg Tyr His Phe Pro Gly Lys
 85 90 95
 Arg Ile Ile Asp Gly Leu Val Asp Leu Pro Phe Ala Leu Pro Thr Ala
 100 105 110
 Val Ala Gly Ile Ala Leu Thr Thr Leu Tyr Thr Thr Asn Gly Trp Ile
 115 120 125
 Gly Gln Tyr Leu Glu Val Phe Gly Ile Arg Ile Ala Phe Thr Pro Leu
 130 135 140
 Gly Val Ile Val Ala Leu Thr Phe Ile Gly Leu Pro Phe Val Val Arg
 145 150 155 160
 Met Val Gln Pro Val Leu Gln Gly Ile Glu Lys Glu Leu Glu Glu Ala
 165 170 175
 Ser Ala Cys Leu Gly Ala Asn Arg Leu Gln Thr Phe Ser Lys Ile Ile
 180 185 190
 Phe Pro Thr Val Leu Pro Ala Leu Leu Thr Gly Phe Ala Leu Ala Phe
 195 200 205
 Ala Arg Ala Leu Gly Glu Tyr Gly Ser Val Val Phe Ile Ser Gly Asn
 210 215 220
 Leu Pro Met Gln Thr Glu Ile Thr Pro Leu Leu Ile Met Thr Lys Leu
 225 230 235 240
 Glu Gln Phe Asp Tyr Ala Gly Ala Thr Ala Leu Ala Ala Val Met Leu
 245 250 255
 Ile Ile Ser Phe Phe Met Leu Leu Phe Ile Asn Ile Leu Gln Trp Trp
 260 265 270
 Ser Gln Arg Arg Gln Leu Ser
 275